Purchasing Division

ADDENDUM NO. 1

DATE: **February 23, 2021**
FROM: **City of Grand Junction Purchasing Division**
TO: **All Offerors**
RE: **Design/Build Canyon View Lighting Replacement Project RFP-4864-21-DH**

Offerors responding to the above referenced solicitation are hereby instructed that the requirements have been clarified, modified, superseded and supplemented as to this date as hereinafter described.

Please make note of the following clarifications:

1. Q. Please see the following attachments that were to be included in the solicitation package.

   - Geotechnical Report
   - IDA Criteria for Community-Friendly Outdoor Sprots Lighting
   - Canyon View Lighting Location map

The original solicitation for the project noted above is amended as noted.

All other conditions of subject remain the same.

Respectfully,

Duane Hoff Jr., Senior Buyer
City of Grand Junction, Colorado

Geotechnical Investigation Report
Canyon View Park Lighting Upgrade Project
Grand Junction, Colorado

Prepared for:

City of Grand Junction
333 West Avenue, Building C
Grand Junction, Colorado 81501

Attention: Mr. Eric C. Mocko, P.E.

February 5, 2021

Prepared by:

RockSol Consulting Group, Inc.
566 West Crete Circle, Unit 2
Grand Junction, Colorado 81505
(970)-822-4350

RockSol Project No. 599.23

Geotechnical Investigation Report
Canyon View Park Lighting Upgrade Project
Grand Junction, Colorado

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RockSol Project No. 599.23

Jacob Sphatt, E.I.T.
Civil Engineering Associate

Donald G. Hunt, P.E.
Senior Geotechnical Engineer

Table of Contents

ATTACHMENTS

1.0 PROJECT PURPOSE AND DESCRIPTION

This report documents the Geotechnical investigation performed by RockSol Consulting Group, Inc. (RockSol) to assist with the design of the Canyon View Park Lighting Upgrade Project in Grand Junction, Colorado. The project consists of replacing the existing lighting system with new light emitting diode (LED) fixtures mounted on a mono-pole type structure. RockSol understands that the existing light poles are experiencing significant degradation of the connections between the pole base and the top of the foundations.

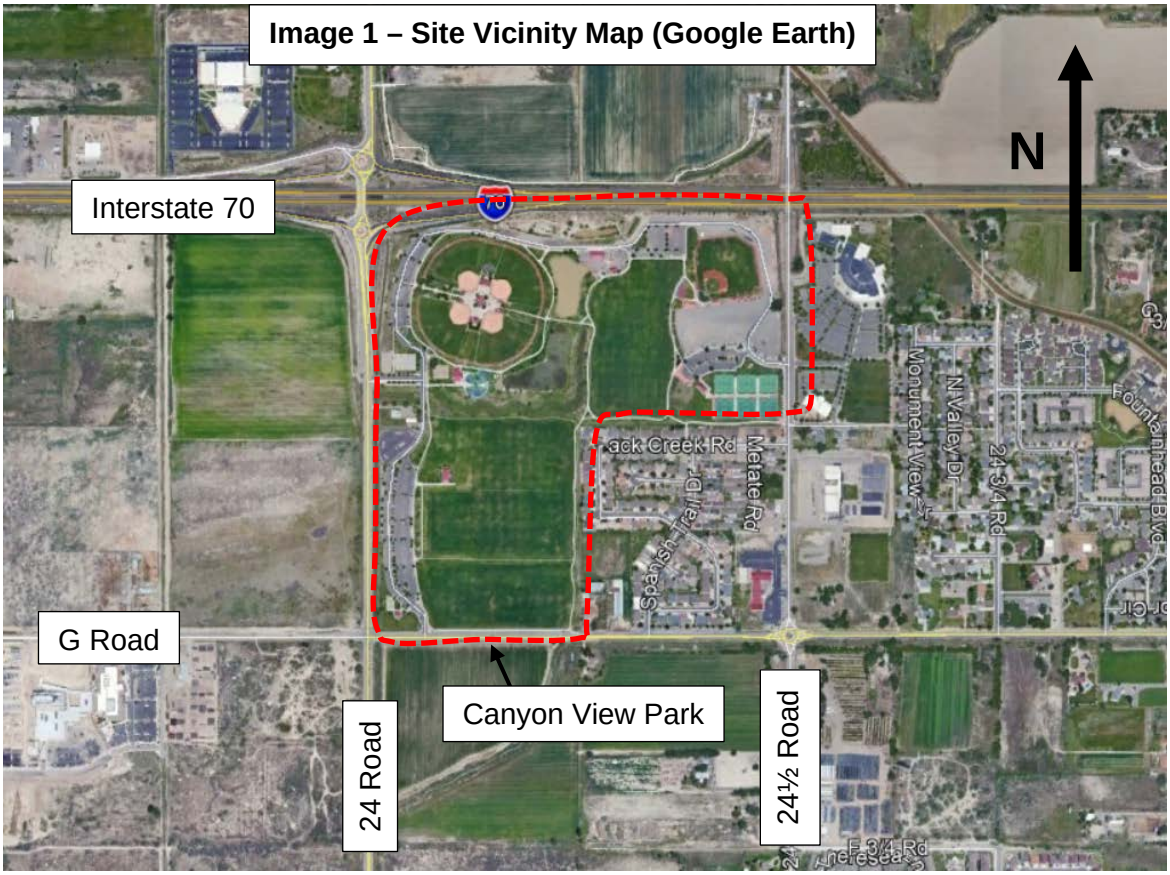
The geotechnical investigation program was conducted to obtain information on the subsurface soil, groundwater and bedrock conditions. The scope of work for this geotechnical investigation included:

- Preparing a drilling/sampling program to perform a subsurface investigation and implementing the program to collect soil samples for laboratory testing.
- Performing laboratory tests and analyzing the data.
- Preparing a geotechnical report presenting the field and laboratory data obtained, geological conditions, and geotechnical parameters for the proposed light pole foundation design.

2.0 PROJECT SITE CONDITIONS

Canyon View Park is located immediately south of Interstate 70 (I-70) and north of G Road between 24 Road and 24½ Road. (See Image 1 – Site Vicinity Map). Canyon View Park is surrounded by undeveloped and agricultural land to the north, west, and south and surrounded by residential and commercial properties to the east.

Image 1 – Site Vicinity Map (Google Earth)



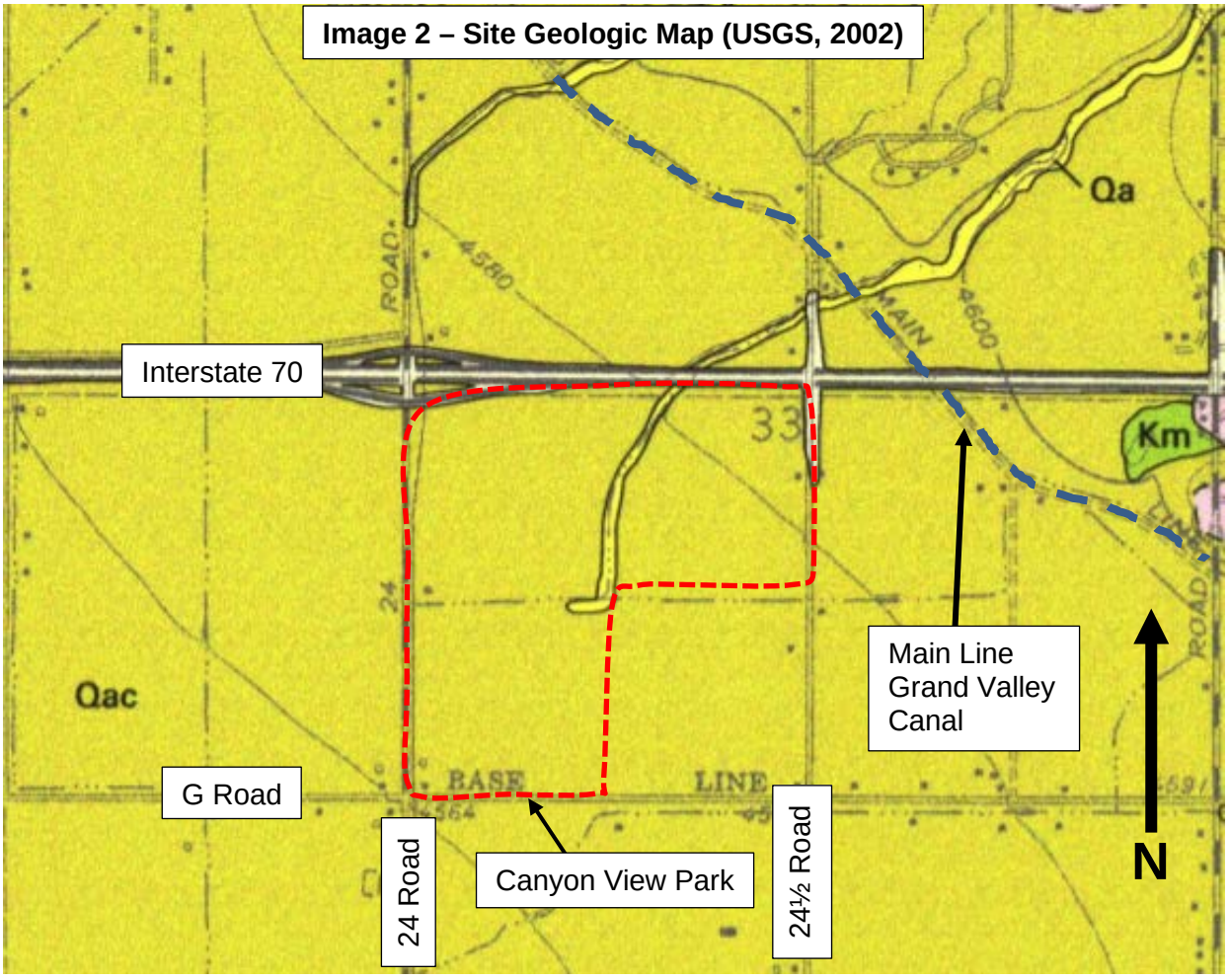
3.0 GEOLOGICAL SETTING

Geologic information about the project site and site vicinity is presented in the United States Geological Survey (USGS) *Geologic Map of the Grand Junction Quadrangle, Mesa County, Colorado* by Robert B. Scott, Paul E. Carrara, William C. Hood, and Kyle E. Murray, dated 2002 (See Image 2 – Site Geology Map).

Based on the USGS map, undivided alluvium and colluvium (Holocene/late Pleistocene) (Qac) is the primary surficial material mapped at the project site. A deposit of Holocene/late Pleistocene alluvium (Qa) is mapped through the middle portion of the Park. A small area of Mancos Shale (Km) is mapped at the ground surface approximately one-half mile to the east of the project site. Mancos Shale generally consists of gray shale and minor sandstone. The Qa alluvium generally consists of silt, sand and gravels and the Qac colluvium generally consists of sandy silt, silty to clayey sand, silty clay, and sandy clay. The materials identified by the USGS mapping was consistent with native soils and bedrock encountered during our geotechnical investigation.

The project site consists of relatively flat slopes with elevation decreasing to the southwest. The Main Line Grand Valley Canal (Canal) is located to the northeast of the project site and cuts through the alluvial deposit that goes through the project site. The Canal flows water for a majority of the year and appears to be unlined, which may contribute to the groundwater conditions observed during our geotechnical investigation. North Leach Creek flows along the west side of the Park.

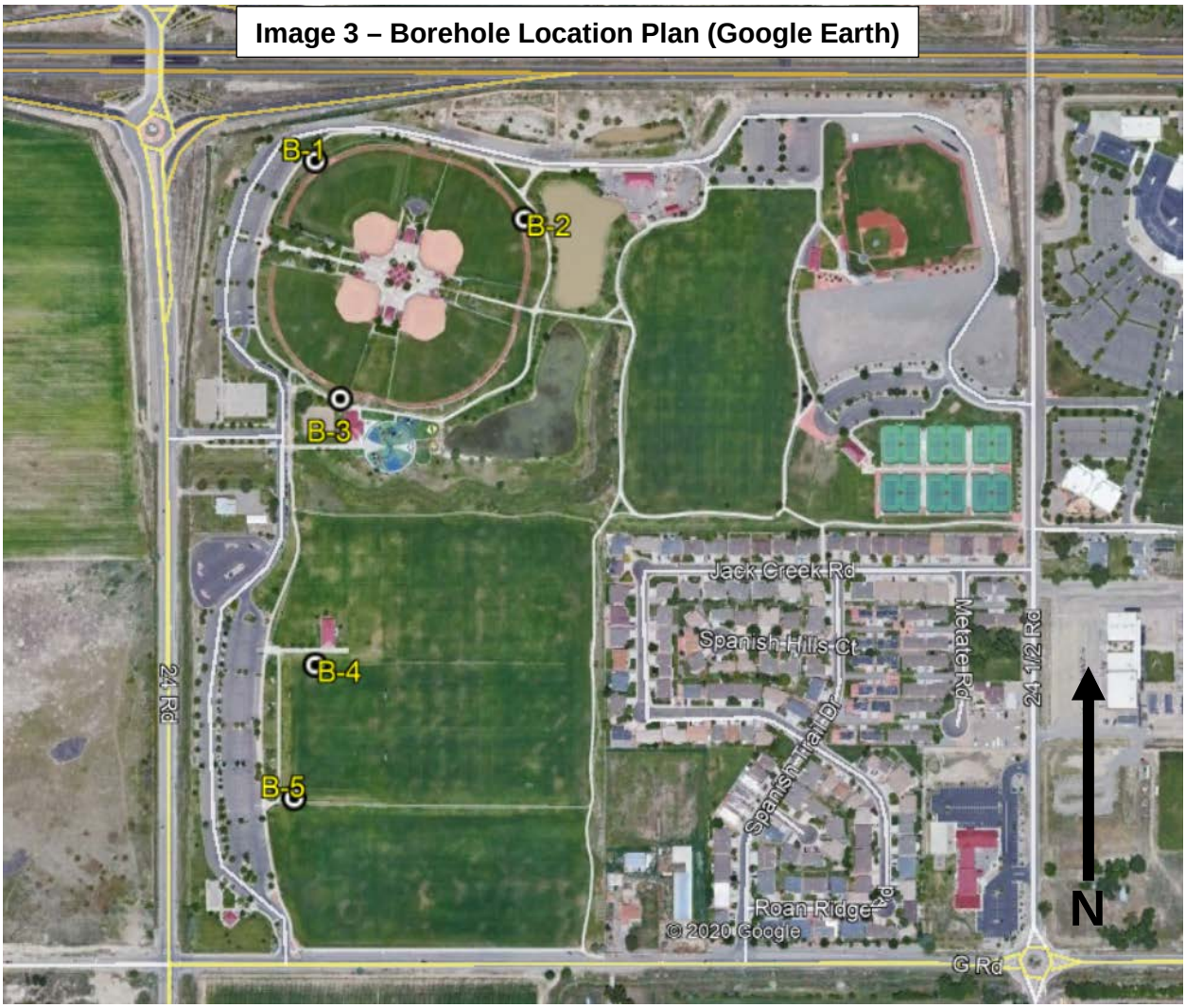
Image 2 – Site Geologic Map (USGS, 2002)



4.0 SUBSURFACE EXPLORATION

For this investigation, RockSol completed 5 geotechnical boreholes identified as B-1 through B-5 at the locations shown on Image 3 and in Appendix A.

Image 3 – Borehole Location Plan (Google Earth)



Boreholes B-1 and B-5 extended to approximate depths ranging from 60 to 65 feet below the existing ground surface to characterize subsurface conditions including groundwater depths/elevations, soil stratigraphy, and bedrock depth/elevations, if encountered. Boreholes B-2 through B-4 extended to approximate depths of 26 feet below the existing ground surface.

The boreholes were completed on January 5, 2021. The boreholes were surveyed after drilling operations were completed by the City of Grand Junction and the survey information (surface elevations, northing, and easting) was provided to RockSol and is summarized in the individual borehole logs in Appendix B.

Boreholes were advanced with a CME 55 track mounted drill rig using an 8-inch outside diameter hollow stem auger. The boreholes were logged in the field by a representative of RockSol with the depth to groundwater, if encountered, noted at the time of drilling. The boreholes were backfilled at the completion of drilling.

Subsurface materials were sampled and resistance of the materials to penetration of the sampler was performed using Modified California barrel and standard split spoon samplers. Penetration tests were performed using an automatic lift system and a hammer weighing 140 pounds falling 30 inches.

The standard split spoon sampling method is the Standard Penetration Test (SPT) described by ASTM Method D-1586. The standard split spoon sampler has an outside diameter of 2 inches and an inside diameter of 1⅜-inches. Sample retaining liners are not used with the standard split spoon sampler.

The Modified California barrel sampler has an outside diameter of approximately 2.5 inches and an inside diameter of 2 inches. The Modified California Barrel sampling method is similar to the SPT test with the difference being the sampler dimensions and the number of 6-inch intervals driven with the hammer per ASTM D3550. It is RockSol's experience that blow counts obtained with the Modified California sampler tend to be slightly greater than a standard split spoon sampler. Brass tube liners were used with the modified California barrel sampler to obtain samples that can be characterized as "relatively" undisturbed, although some sample disturbance does occur as part of the sampling process.

Penetration resistance values (blow counts) were recorded for each sampling event. Blow counts, when properly evaluated, indicate the relative density or consistency of the soils. Depths at which the samples were taken, the type of sampler used, and the blow counts that were obtained are shown on the Borehole Logs (See Appendix B).

5.0 SITE SOIL AND BEDROCK CHARACTERIZATION

5.1 Surficial Materials

Surficial soils at boring locations generally consist of a relatively thin cover of moist, brown, silty sand topsoil, approximately 3 inches in thickness and supporting a moderate to thick cover of sod vegetation.

5.2 Subsurface Materials

Subsurface materials encountered at all boreholes in the upper 26-feet generally consisted of very soft to medium stiff silty to sandy clay with sandy silt lenses in parts. In Borehole B-1 the silty to sandy clay material extended to a depth of 50 feet and in Borehole B-5 this material extended to a depth of 43 feet. In Borehole B-1 dense silty sand with gravel was encountered at a depth of 50 feet and extended to the maximum depth drilled of 66 feet. Loose sand was encountered at a depth of 43 feet in Borehole B-5 and extending to a depth of 60 feet

5.3 Sedimentary Bedrock

Sedimentary bedrock was encountered at Borehole B-5 at approximately 60-feet below existing ground surface and consisted of very hard dark gray claystone and shale, consistent with Mancos Shale. Bedrock not encountered to the depths drilled at Boreholes B-1 through B-4. Bedrock depth and elevation, where encountered, is summarized in Table 1 – *Bedrock and Groundwater Summary.*

5.4 Groundwater

Groundwater was encountered during drilling/sampling activities at all boreholes at approximate depths ranging from 8 to 13 feet below the existing ground surface at the time of drilling operations. See Table 1, *Bedrock and Groundwater Summary* for approximate depths and elevations to groundwater and bedrock, where encountered.

Table 1 – Groundwater and Bedrock Summary

Borehole I.D.	Ground Surface Elevation (Feet)	Borehole Depth (Feet)	Groundwater Depth (Feet)	Groundwater Elevation (Feet)	Bedrock Depth (Feet)	Bedrock Elevation (Feet)
B-1	4580.0	66.0	10.0	4570.0	NE	NE
B-2	4579.8	26.0	10.0	4569.8	NE	NE
B-3	4579.6	26.0	12.0	4567.6	NE	NE
B-4	4568.9	26.0	13.0	4555.9	NE	NE
B-5	4571.0	60.2	8.0	4563.0	60.0	4511.0

NE = Not Encountered

Groundwater elevations are subject to change depending on climatic conditions, Colorado River flow stages, North Leach Creek flow stages, local irrigation practices, changes in local topography, and changes in surface storm water management. Long-term monitoring of groundwater elevations is required to establish groundwater fluctuations.

6.0 LABORATORY TESTING SUMMARY

Soil samples retrieved from borehole locations were examined by the project geotechnical engineer in the RockSol laboratory. Selected samples were tested and classified according to the Unified Soil Classification System (USCS). The following laboratory tests were performed in accordance with the American Society for Testing and Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), and current local practices:

- Percent Passing No. 200 Sieve (ASTM D-1140)
- Liquid and Plastic Limits (ASTM D-4318)
- Soil Classification (ASTM D-2487, ASTM D-2488, and AASHTO M145)
- Gradation (ASTM D6913)
- Water-Soluble Sulfates (CDOT CP-L 2103)
- Water-Soluble Chloride Content (AASHTO T291-91)
- Standard Test Method for pH of Soils (ASTM D4972-01)
- Soil Resistivity (ASTM G187 - Soil Box)
- Swell Test (ASTM D-4546)

Laboratory test results were used to characterize the engineering properties of the subsurface material. For soil classification, RockSol conducted sieve analyses and Atterberg Limits tests. All laboratory tests were performed by RockSol. Laboratory test results are presented in Appendix C.

7.0 SUBSURFACE CHARACTERIZATION

Laboratory test results were used to characterize the engineering properties of the subsurface material encountered. For soil classification, RockSol conducted sieve analyses and Atterberg Limits tests. Lab testing was also performed on selected samples to determine the water-soluble

sulfate and chloride content of subsurface materials to assist with cement type recommendations. A summary of the physical and chemical test results is included in Appendix C.

7.1 Subsurface Soil Classification

Subsurface bulk samples and split spoon samples were obtained at various depths from each borehole location and were tested for AASHTO and USCS soil classification. The subsurface soils tested generally consisted of the A-4 AASHTO soil type and USCS soil types CL, ML, and CL-ML. A summary of the subsurface soil classifications is presented in Table 2.

Table 2 – Subsurface Soil Classifications

Borehole Location	Depth (feet)	AASHTO Classification	USCS Classification
B-1	5	A-4 (0)	ML
B-1	20	A-4 (4)	CL
B-1	55	A-3 (0)	
B-2	10	A-4 (0)	ML
B-3	15	A-4 (0)	ML
B-4	15	A-4 (3)	CL-ML
B-5	0-41	A-4 (4)	CL

7.2 Water-Soluble Sulfate Content

Cementitious material requirements for concrete in contact with site soils or groundwater is typically based on the percentage of water-soluble sulfate in the soil or groundwater. Mix design requirements for concrete exposed to water-soluble sulfates in soils or water is considered by CDOT as shown in Table 3 and in the CDOT Standard Specifications for Road and Bridge Construction, dated 2019. Water-soluble sulfate testing results for samples tested for this project are summarized in Table 4.

Table 3 – Requirements to Protect Against Damage to Concrete by Sulfate Attack from External Sources of Sulfate

Severity of Sulfate Exposure	Water-Soluble Sulfate (SO_4), in dry soil, percent	Sulfate (SO_4), in water, ppm	Water Cementitious Ratio, Maximum	Cementitious Material Requirements
Class 0	0.00 to 0.10	0 to 150	0.45	Class 0
Class 1	0.11 to 0.20	151 to 1,500	0.45	Class 1
Class 2	0.21 to 2.0	1,501 to 10,000	0.45	Class 2
Class 3	2.01 or greater	10,001 or greater	0.40	Class 3

Table 4 – Water-Soluble Sulfate Testing Summary

Borehole I.D.	Sample Depth (Feet)	Water-Soluble Sulfate (SO_4) in dry soil, percent	Cementitious Material Requirements
B-1	15	0.59	Class 2
B-1	30	1.38	Class 2
B-2	5	0.94	Class 2
B-3	20	0.64	Class 2
B-4	5	0.72	Class 2
B-4	20	1.14	Class 2
B-5	0-41	0.48	Class 2

The concentration of water-soluble sulfates measured in soil samples obtained from RockSol's exploratory boreholes ranged from 0.48 percent to 1.38 percent by weight. The test results indicate that water-soluble sulfates are present in the subsurface soils at this site. Based on the test results, RockSol recommends all concrete placed for this project be constructed with cement meeting the requirements for CDOT Exposure Class 2 as presented in Section 601.04 of the 2019 CDOT Standard Specifications for Road and Bridge Construction. Our recommendation would also apply to all pre-cast concrete elements placed at this site.

8.0 FOUNDATION DESIGN PARAMETER RECOMMENDATIONS

Based on the information provided to RockSol, the existing light pole foundations are cylindrical concrete elements with embedment depths not known. RockSol anticipates that a pre-cast concrete foundation or a drilled-shaft (caisson) foundation will be used for the new light pole structures. RockSol recommends design of the foundation systems using the non-constrained depth of embedment formula per Chapter 18 of the International Building Code (IBC), Equation 18-1. This equation is included in Appendix D. Equation 18-1 also references Table 1806.2 in IBC Section 1806.2 (Presumptive Load-Bearing Values).

8.1 Light Pole Foundation Design Parameters

Based on the soil types encountered to depths of at least 26 feet, RockSol recommends a design soil type identified as "cohesive" as it is primarily fine-grained material consisting of silt and clay with varying percentages of sand (Class 6 Materials per IBC Table 1806.2). Based on sampler driving resistance (blow counts) observed during drilling operations, the material is soft to very soft but for design purposes, a very soft consistency is recommended. Unconfined compression tests were not performed but based on blow counts and using the Terzaghi Standard for cohesive soils chart presented in Appendix D, a cohesion value of 250 psf is recommended. Based on the conditions encountered RockSol also recommends reduced values for allowable vertical foundation pressure and lateral bearing pressure from the presumptive values listed in IBC Table 1806.2 for Class 6 Materials. A summary of recommended foundation design parameters is summarized in Table 6.

Table 6 – Foundation Design Parameters

Design Soil Type	Consistency	Cohesion (C), psf	Allowable Vertical Foundation Pressure (psf)	Lateral Bearing Pressure (psf/ft)
Cohesive	Very Soft	250	1,000	80

Additional design and construction considerations for installation of the light pole foundations are presented below.

(a) During excavation for installation of the foundation, casing or slurry methods will be required to support the excavation due to relatively shallow groundwater conditions. Groundwater was encountered in the boreholes drilled at approximate depths ranging from 8 to 13 feet. Caving conditions are anticipated at and below groundwater elevations and may also occur above groundwater elevations due to saturated soil conditions that can be present above the groundwater elevation.

(b) Prior to concrete placement, the excavation bottom should be cleaned of all loose material. For wet conditions (more than two inches of water), concrete placement by "tremie" methods should be used to displace all accumulated water and/or slurry, if used.

(c) If a pre-cast concrete foundation is used, the excavation should be oversized by at least 8 inches beyond the foundation perimeter. After installation of the pre-cast foundation the annular space must be completely filled with concrete.

9.0 OTHER DESIGN AND CONSTRUCTION CONSIDERATIONS

Proper construction practices and adherence to project plans and specifications should be followed during site preparation, earthwork, excavations, and construction of associated utilities for the suitable long-term performance of the proposed structures. Excavation support should be provided to maintain onsite safety and the stability of excavations. Excavations shall be constructed in accordance with local, state, and federal regulations including OSHA guidelines. The contractor must provide a competent person to determine compliance with OSHA excavation requirements. For preliminary planning, native soils may be considered as OSHA Type C soils.

10.0 LIMITATIONS

This geotechnical investigation was conducted in general accordance with the scope of work to provide geotechnical support for construction of the Canyon View Park Lighting Upgrade Project for the City of Grand Junction

Surface and groundwater hydrology, hydraulic engineering, and environmental studies including contaminant characterization were not included in RockSol's geotechnical scope of work.

The geotechnical practices are similar to that used in Colorado with similar soil conditions and our understanding of the proposed work. This report has been prepared by RockSol for the City of Grand Junction exclusively for the project described in this report. The report is based on our exploratory boreholes and does not take into account variations in the subsurface conditions that may exist between boreholes. Additional investigation is required to address such variation. If during construction activities, materials or water conditions appear to be different from those described herein, RockSol should be advised at once so that a re-evaluation of the recommendations presented in this report can be made. RockSol is not responsible for liability associated with interpretation of subsurface data by others

APPENDIX A

BOREHOLE LOCATION PLAN


Canyon View Park
Borehole location Plan
Legend
Borehole Locations
B-1
B-2
B-3
B-4
B-5
70
24 Rd
Spanish Hills Ct
Willow Creek Rd
N
1000 ft
Google Earth
© 2020 Google

APPENDIX B

LEGEND AND INDIVIDUAL BORING SOIL LOGS

RockSol Consulting Group, Inc.

LEGEND

CLIENT City of Grand Junction
PROJECT NAME Canyon View Lighting Project
PROJECT NUMBER 599.23
PROJECT LOCATION Grand Junction, Colorado

LITHOLOGY

- TOPSOIL
- Native - SAND
- Native - SAND, silty
- Native - CLAY, silty to sandy with SILT lenses in parts
- Bedrock - SHALE

SAMPLE TYPE

- Auger Cuttings
- MODIFIED CALIFORNIA SAMPLER 2.5" O.D. AND 2" I.D. WITH BRASS LINERS INCLUDED
- SPLIT SPOON SAMPLER 2" O.D. AND 1 3/8" I.D. NO LINERS

Fines Content indicates amount of material, by weight, passing the US No 200 Sieve (%)

15/12 Indicates 15 blows of a 140 pound hammer falling 30 inches was required to drive the sampler 12 inches.

50/11 Indicates 50 blows of a 140 pound hammer falling 30 inches was required to drive the sampler 11 inches.

5,5,5 Indicates 5 blows, 5 blows, 5 blows of a 140 pound hammer falling 30 inches was required to drive the sampler 18 inches.

- GROUND WATER LEVEL 1ST DEPTH
- GROUND WATER LEVEL 2ND DEPTH

RockSol Consulting Group, Inc.

BORING : B-1

CLIENT City of Grand Junction
PROJECT NAME Canyon View Lighting Project
PROJECT NUMBER 599.23
PROJECT LOCATION Grand Junction, Colorado
DATE STARTED 1/5/21 **COMPLETED** 1/5/21
GROUND ELEVATION 4580.0 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith
NORTH 52472.0 **EAST** 79330.9
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 8.0"
BORING LOCATION: N of softball field
LOGGED BY J. Obanion **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES
WATER DEPTH 10.0 ft on 1/5/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4580.0	0		(Topsoil) SAND, silty, moist, brown, approximately 3 inches thick, moderate to thick vegetation cover										
			(Native) CLAY, silty to sandy with sandy silt in parts, slightly moist to wet, brown, soft to very soft	MC	4/12			101.7	17.9	NP	NP	NP	76.7
4570.0	10			MC	1/12	-0.3		97.8	22.7				
				MC	1/12		0.59	99.0	25.3				
4560.0	20			MC	2/12			100.8	24.1	24	16	8	74.3
4550.0	30			MC	4/12		1.38	100.3	24.8				
4540.0	40			MC	4/12			98.8	25.1				
4530.0	50		(Native) SAND, silty with gravel, wet, brownish red and black to brownish gray and black to light brown, dense, cobbles in parts	SS	11/23/28				11.0	NP	NP	NP	7.7
4520.0	60			SS	8/23/29				15.5				
			Bottom of hole at 66.0 feet.										

LOG - STANDARD 599.23_CANYON VIEW GJ COLORADO.GPJ 2/2/21

RockSol Consulting Group, Inc.

BORING : B-2

CLIENT City of Grand Junction
PROJECT NAME Canyon View Lighting Project
PROJECT NUMBER 599.23
PROJECT LOCATION Grand Junction, Colorado
DATE STARTED 1/5/21 **COMPLETED** 1/5/21
GROUND ELEVATION 4579.8 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith
NORTH 52291.1 **EAST** 79973.2
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 8.0"
BORING LOCATION: E side of softball field
LOGGED BY J. Obanion **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES
WATER DEPTH 10.0 ft on 1/5/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4579.8	0		(Topsoil) SAND, silty, moist, brown, approximately 6 inches thick, moderate to thick vegetation cover										
			(Native) CLAY, silty to sandy, moist, brown, very soft										
4574.8	5			MC	3/12		0.94	97.1	20.9				
			(Native) CLAY, silty to sandy with sandy silt in parts, wet, brown, very soft										
4569.8	10			MC	1/12			95.4	27.9	NP	NP	NP	98.1
4564.8	15			MC	1/12			92.3	25.0				
			SAND lense at approximately 18.5 feet										
4559.8	20		(Native) CLAY, silty to sandy, wet, brown, very soft	MC	1/12			93.8	26.4				
4554.8	25			MC	2/12			95.5	25.3				
			Bottom of hole at 26.0 feet.										

RockSol Consulting Group, Inc.

BORING : B-3

CLIENT City of Grand Junction
PROJECT NAME Canyon View Lighting Project
PROJECT NUMBER 599.23
PROJECT LOCATION Grand Junction, Colorado
DATE STARTED 1/5/21 **COMPLETED** 1/5/21
GROUND ELEVATION 4579.6 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith
NORTH 51753.2 **EAST** 79405.6
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 8.0"
BORING LOCATION: SW corner of softball field
LOGGED BY J. Obanion **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES
WATER DEPTH 12.0 ft on 1/5/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4579.6	0		(Topsoil) SAND, silty, moist, brown, approximately 3 inches thick, moderate to thick vegetation cover										
			(Native) CLAY, silty to sandy, slightly moist, brown, stiff, slightly calcareous										
4574.6	5			MC	12/12	0.0		108.7	15.4				
			(Native) CLAY, silty to sandy, moist, brown, soft to very soft										
4569.6	10			MC	3/12			96.9	22.9				
			(Native) CLAY, silty to sandy, wet, brown, soft to very soft										
4564.6	15			MC	2/12			96.9	26.3	NP	NP	NP	78.9
			(Native) CLAY, silty to sandy with trace gravel, wet, brown, very soft										
4559.6	20			MC	2/12		0.64	100.1	23.2				
4554.6	25			MC	1/12			97.5	24.6				
			Bottom of hole at 26.0 feet.										

LOG - STANDARD 599.23 CANYON VIEW GJ COLORADO.GPJ 2/2/21

RockSol Consulting Group, Inc.

BORING : B-4

CLIENT City of Grand Junction
PROJECT NAME Canyon View Lighting Project
PROJECT NUMBER 599.23
PROJECT LOCATION Grand Junction, Colorado
DATE STARTED 1/5/21 **COMPLETED** 1/5/21
GROUND ELEVATION 4568.9 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith
NORTH 50932.6 **EAST** 79493.0
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 8.0"
BORING LOCATION: NE corner of soccer field
LOGGED BY J. Obanion **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES
WATER DEPTH 13.0 ft on 1/5/21

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4568.9	0		(Topsoil) SAND, silty, moist, brown, approximately 3 inches thick, moderate to thick vegetation cover										
			(Native) CLAY, silty, moist, brown, very soft										
4563.9	5			MC	1/12	-0.8	0.72	106.4	21.2				
			(Native) CLAY, silty to sandy, moist, brown, very soft to soft										
4558.9	10			MC	1/12				19.2				
			(Native) CLAY, silty to sandy, wet, brown, very soft to soft										
4553.9	15			SS	1/1/0				26.5	24	18	6	77.3
4548.9	20			SS	1/2/3		1.14		27.9				
4543.9	25			MC	3/12			95.9	24.5				
			Bottom of hole at 26.0 feet.										

LOG - STANDARD 599.23_CANYON VIEW GJ COLORADO.GPJ 2/2/21

RockSol Consulting Group, Inc.

BORING : B-5

CLIENT City of Grand Junction
PROJECT NAME Canyon View Lighting Project
PROJECT NUMBER 599.23
PROJECT LOCATION Grand Junction, Colorado
DATE STARTED 1/5/21 **COMPLETED** 1/5/21
GROUND ELEVATION 4571.0 ft **STATION NO.**
DRILLING CONTRACTOR DA Smith
NORTH 50526.8 **EAST** 79262.8
DRILLING METHOD Hollow Stem Auger **HOLE SIZE** 8.0"
BORING LOCATION: SW corner of soccer field
LOGGED BY J. Obanion **HAMMER TYPE** Automatic
GROUND WATER LEVELS:
NOTES
WATER DEPTH 8.0 ft on 1/5/21

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	SAMPLE TYPE	BLOW COUNTS	SWELL POTENTIAL (%)	SULFATE (%)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
4571.0	0	(Topsoil) SAND, silty, moist, brown, approximately 3 inches thick, moderate to thick vegetation cover	BULK			0.48			23	14	9	76.9
		(Native) CLAY, silty to sandy, moist to wet, brown, medium stiff to very soft	MC	7/12	-0.2		92.3	15.4				
4561.0	10		MC	2/12			102.9	20.1				
		(Native) CLAY, silty to sandy, wet, brown, very soft to medium stiff	SS	1/1/0				25.8				
		Approximate Bulk Depth 0-41 Liquid Limit= 23 Plastic Limit= 14 Plasticity Index= 9 Fines Content= 76.9 Sulfate= 0.4800										
4551.0	20		SS	1/1/0				26.9				
			MC	3/12			98.8	25.3				
4541.0	30		MC	6/12			98.0	25.2				
		(Native) CLAY, silty to sandy with minor gravel, wet, brownish red, very soft, iron staining, cobbles intermixed	MC	2/12			98.3	25.9				
4531.0	40											
		(Native) SAND, trace gravel, wet to very wet, brown, loose	SS	1/0/0				27.7				9.8
4521.0	50											
			MC	1/12								
4511.0	60											
		(Bedrock) SHALE, dry, dark brown with gray, very hard	SS	50/2.5		0.31		24.3				
		Bottom of hole at 61.0 feet.										

LOG - STANDARD 599.23_CANYON VIEW GJ COLORADO.GPJ 2/2/21

APPENDIX C

SUMMARY OF LABORATORY TEST RESULTS

RockSol Consulting Group, Inc.

SUMMARY OF PHYSICAL & CHEMICAL TEST RESULTS

CLIENT City of Grand Junction

PROJECT NAME Canyon View Lighting Project

PROJECT NUMBER 599.23

PROJECT LOCATION Grand Junction, Colorado

Borehole	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	Swell Potential (%)	%<#200 Sieve	Classification		Water Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (psi)	Sulfate (%)	Resistivity (ohm-cm)	pH	Chlorides (%)	Proctor S=Standard M=Modified		
							USCS	AASHTO								MDD	OMC	S/M
B-1	5	NP	NP	NP		77	ML	A-4 (0)	17.9	101.7								
B-1	10				-0.3				22.7	97.8								
B-1	15								25.3	99.0		0.59						
B-1	20	24	16	8		74	CL	A-4 (4)	24.1	100.8								
B-1	30								24.8	100.3		1.38						
B-1	40								25.1	98.8								
B-1	55	NP	NP	NP		8		A-3 (0)	11.0									
B-1	65								15.5									
B-2	5								20.9	97.1		0.94						
B-2	10	NP	NP	NP		98	ML	A-4 (0)	27.9	95.4								
B-2	15								25.0	92.3								
B-2	20								26.4	93.8								
B-2	25								25.3	95.5								
B-3	5				0.0				15.4	108.7								
B-3	10								22.9	96.9								
B-3	15	NP	NP	NP		79	ML	A-4 (0)	26.3	96.9								
B-3	20								23.2	100.1		0.64						
B-3	25								24.6	97.5								
B-4	5				-0.8				21.2	106.4		0.72						
B-4	10								19.2									
B-4	15	24	18	6		77	CL-ML	A-4 (3)	26.5									
B-4	20								27.9			1.14						
B-4	25								24.5	95.9								
B-5	0-41	23	14	9		77	CL	A-4 (4)				0.48	750 @ 19.8%	8.2	0.0136			
B-5	5				-0.2				15.4	92.3								
B-5	10								20.1	102.9								
B-5	15								25.8									
B-5	20								26.9									
B-5	25								25.3	98.8								
B-5	30								25.2	98.0								

RockSol Consulting Group, Inc.

SUMMARY OF PHYSICAL & CHEMICAL TEST RESULTS

CLIENT City of Grand Junction

PROJECT NAME Canyon View Lighting Project

PROJECT NUMBER 599.23

PROJECT LOCATION Grand Junction, Colorado

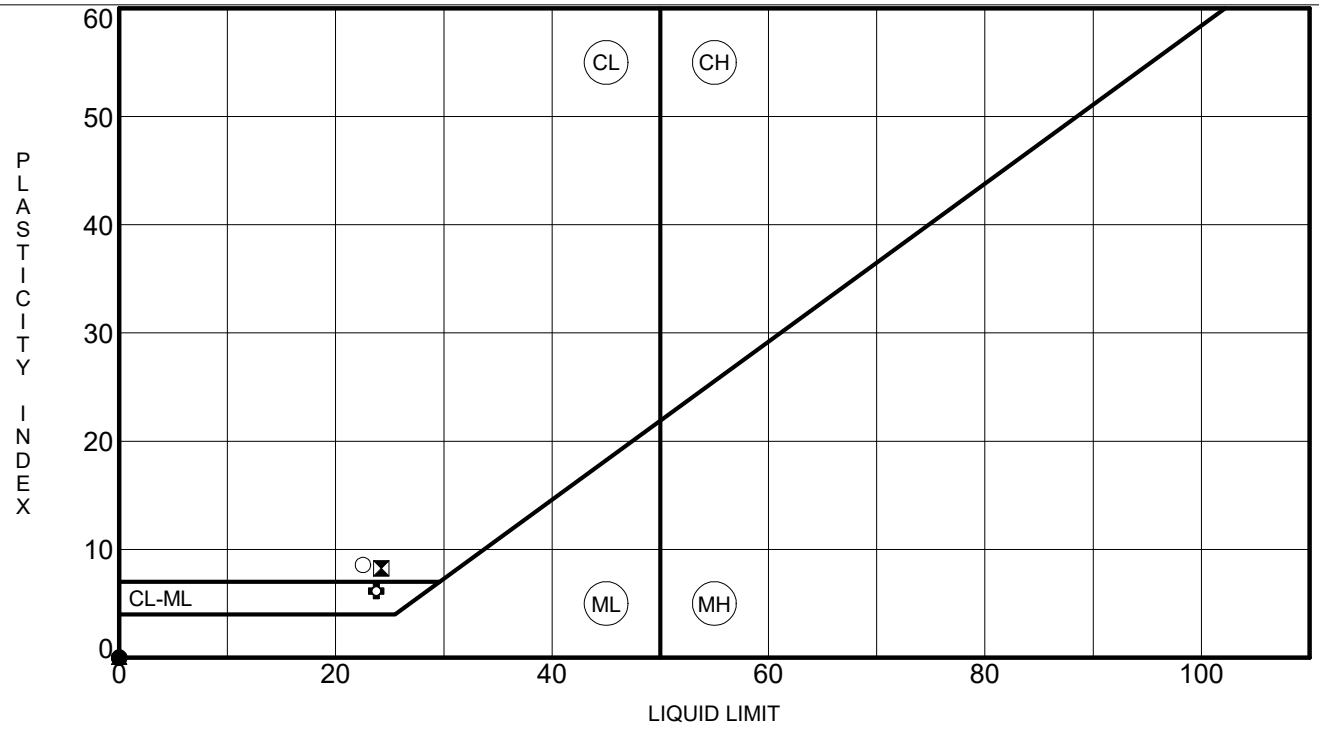
Borehole	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	Swell Potential (%)	%<#200 Sieve	Classification		Water Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (psi)	Sulfate (%)	Resistivity (ohm-cm)	pH	Chlorides (%)	Proctor S=Standard M=Modified		
							USCS	AASHTO								MDD	OMC	S/M
B-5	35								25.9	98.3								
B-5	45					10			27.7									
B-5	60								24.3			0.31						

RockSol Consulting Group, Inc.

ATTERBERG LIMITS RESULTS
AASHTO T89 Method A/T90

CLIENT City of Grand Junction **PROJECT NAME** Canyon View Lighting Project

PROJECT NUMBER 599.23 **PROJECT LOCATION** Grand Junction, Colorado



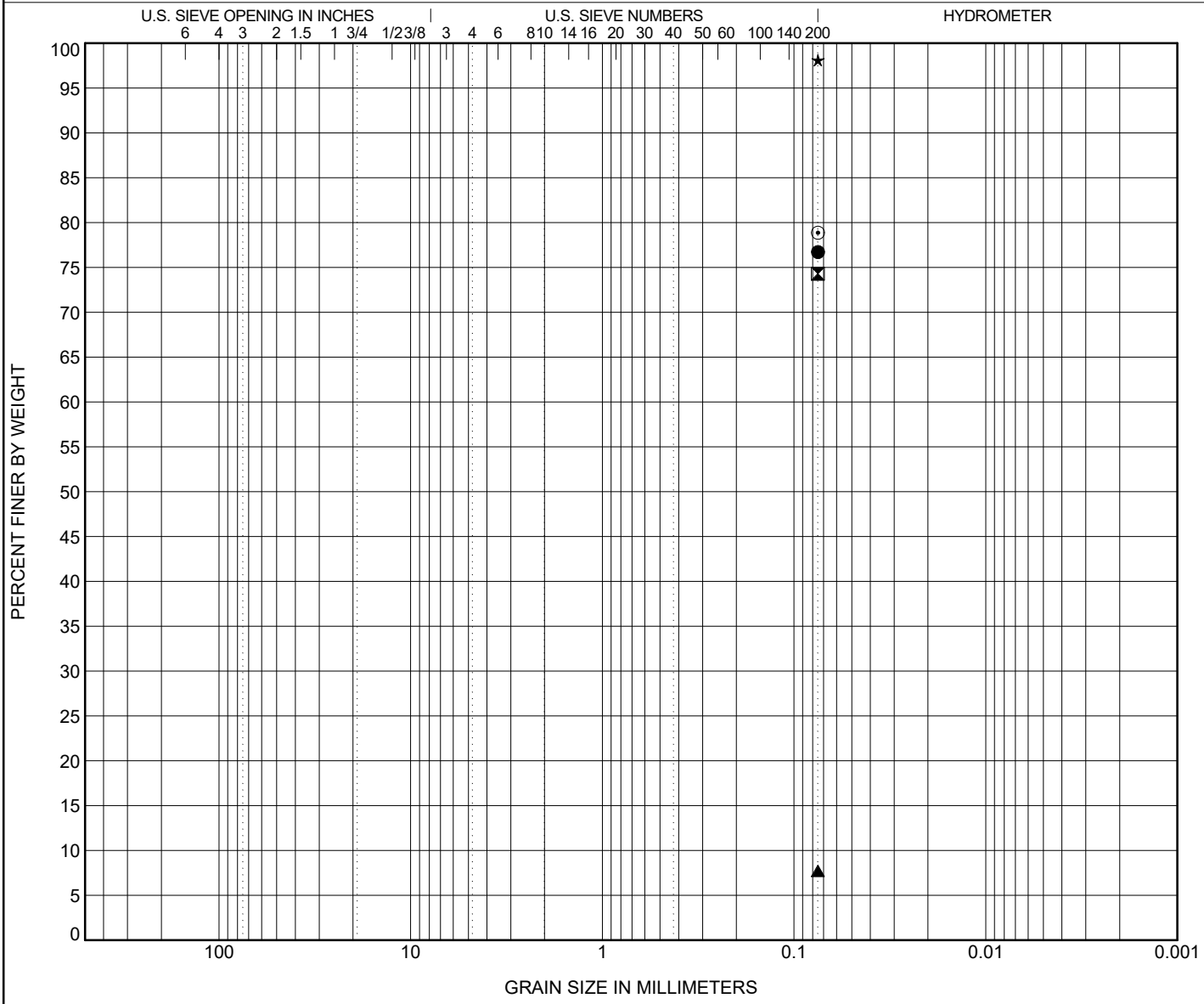
	Specimen Identification		LL	PL	PI	Fines	Classification
●	B-1	5.0	NP	NP	NP	76.7	SILT with SAND (ML) (A-4)
⧓	B-1	20.0	24	16	8	74.3	LEAN CLAY with SAND (CL) (A-4)
▲	B-1	55.0	NP	NP	NP	7.7	SAND, silty with gravel (A-3)
★	B-2	10.0	NP	NP	NP	98.1	SILT (ML) (A-4)
⊙	B-3	15.0	NP	NP	NP	78.9	SILT with SAND (ML) (A-4)
✿	B-4	15.0	24	18	6	77.3	SILTY CLAY with SAND (CL-ML) (A-4)
○	B-5	0.0-41.0	23	14	9	76.9	LEAN CLAY with SAND (CL) (A-4)

GRAIN SIZE DISTRIBUTION

Rocksol Consulting Group

CLIENT City of Grand Junction **PROJECT NAME** Canyon View Lighting Project

PROJECT NUMBER 599.23 **PROJECT LOCATION** Grand Junction, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-1	5.0	SILT with SAND (ML) (A-4)	NP	NP	NP		
⊠	B-1	20.0	LEAN CLAY with SAND (CL) (A-4)	24	16	8		
▲	B-1	55.0	SAND, silty with gravel (A-3)	NP	NP	NP		
★	B-2	10.0	SILT (ML) (A-4)	NP	NP	NP		
⊙	B-3	15.0	SILT with SAND (ML) (A-4)	NP	NP	NP		

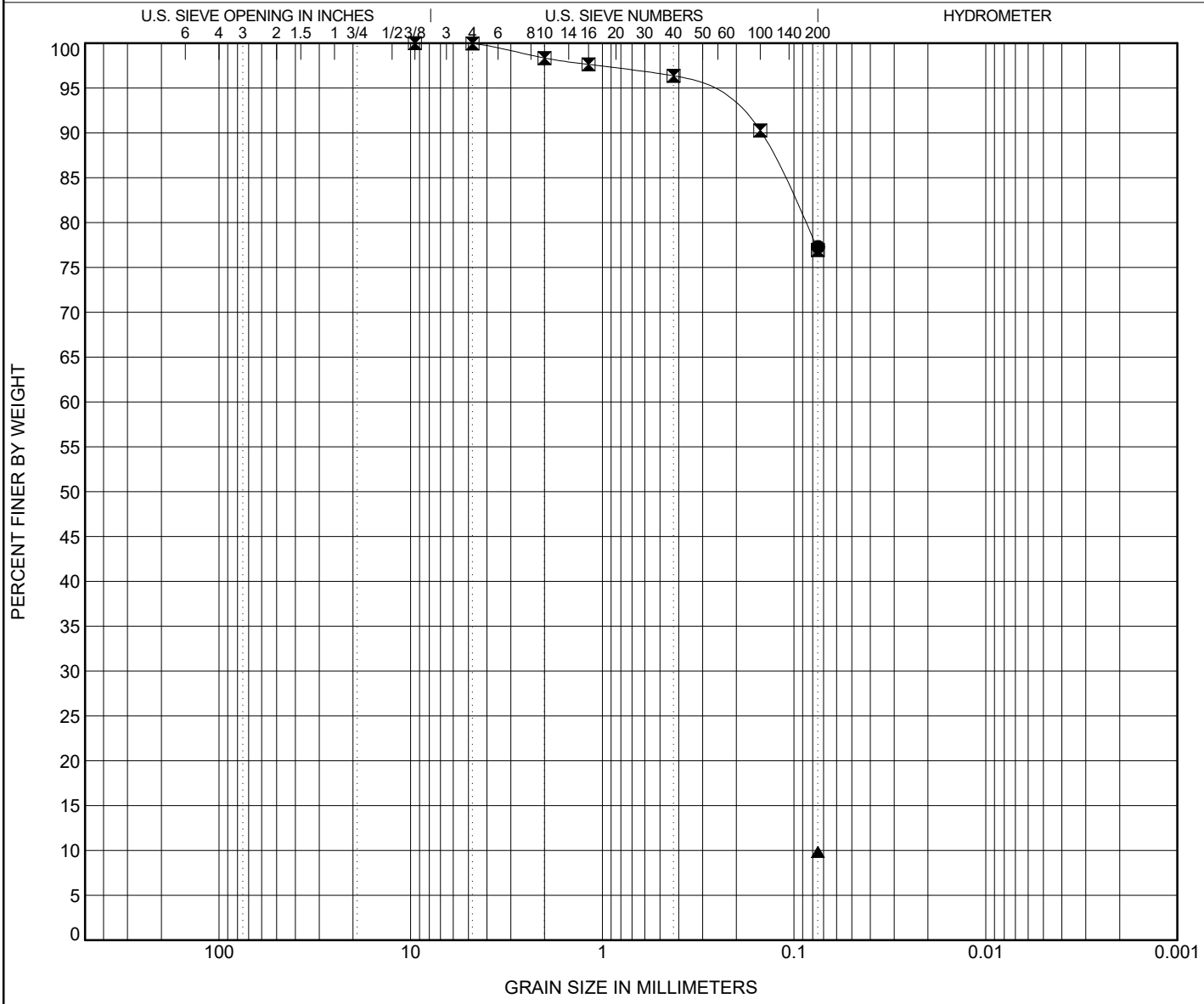
Specimen Identification			D100	D60	D30	D10	%Gravel	%Coarse Sand	%Fine Sand	%Silt	%Clay
●	B-1	5.0	0.075							76.7	
⊠	B-1	20.0	0.075							74.3	
▲	B-1	55.0	0.075							7.7	
★	B-2	10.0	0.075							98.1	
⊙	B-3	15.0	0.075							78.9	

GRAIN SIZE DISTRIBUTION

Rocksol Consulting Group

CLIENT City of Grand Junction **PROJECT NAME** Canyon View Lighting Project

PROJECT NUMBER 599.23 **PROJECT LOCATION** Grand Junction, Colorado



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	B-4	15.0	SILTY CLAY with SAND (CL-ML) (A-4)	24	18	6		
⊠	B-5	0.0-41.0	LEAN CLAY with SAND (CL) (A-4)	23	14	9		
▲	B-5	45.0	SAND, minor gravel					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Coarse Sand	%Fine Sand	%Silt	%Clay
●	B-4	15.0	0.075							77.3	
⊠	B-5	0.0-41.0	9.5				1.7	2.0	19.4	76.9	
▲	B-5	45.0	0.075							9.8	

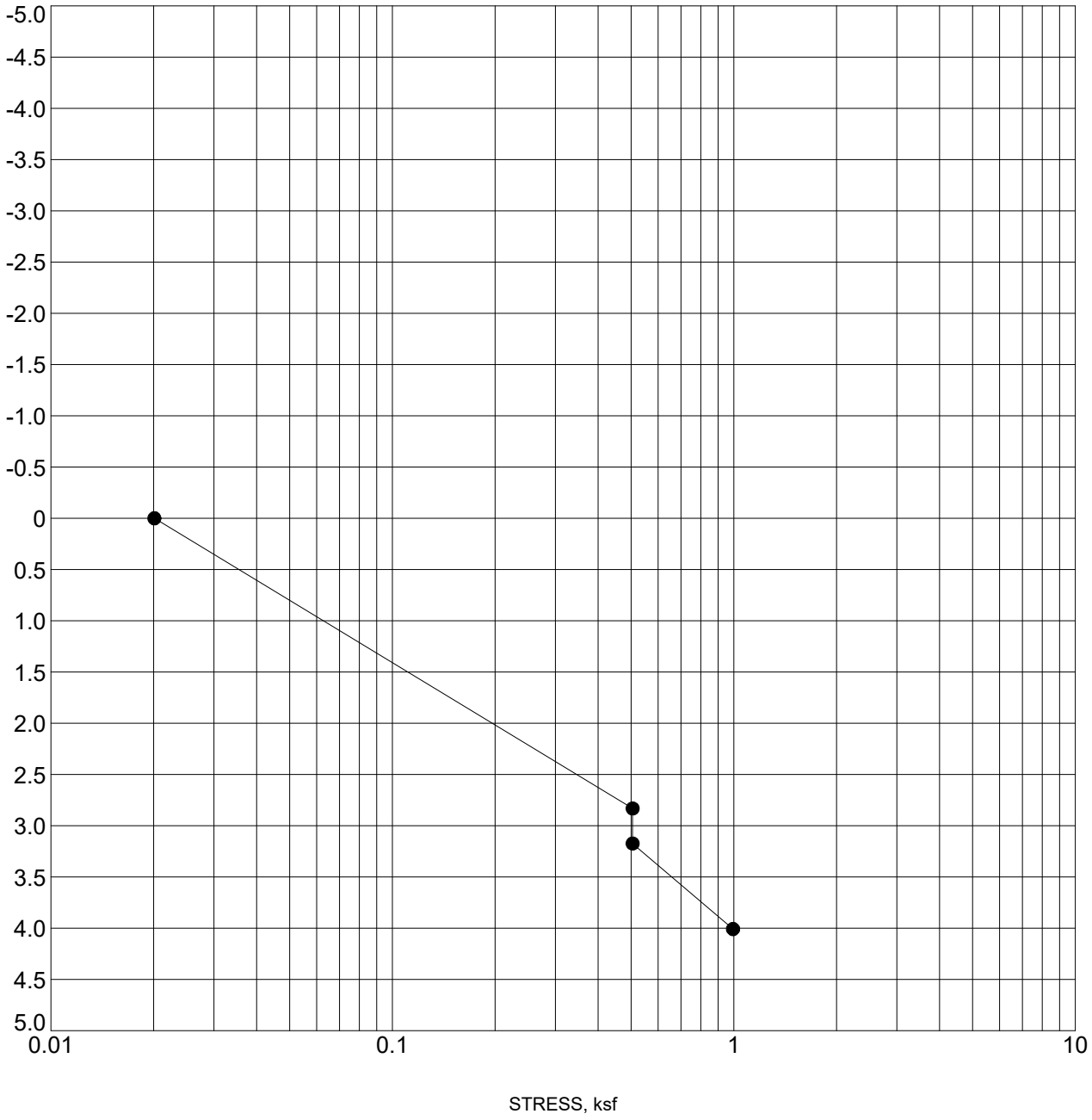
GRADATION - STANDARD 599.23_CANYON VIEW GJ COLORADO.GPJ ROCKSOL TEMPLATE.GDT 2/2/21

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Canyon View Lighting Project

PROJECT NUMBER 599.23 **PROJECT LOCATION** Grand Junction, Colorado



Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-1** **10**	**CLAY, silty to sandy**	**-0.3**	**97.8**	**22.7**

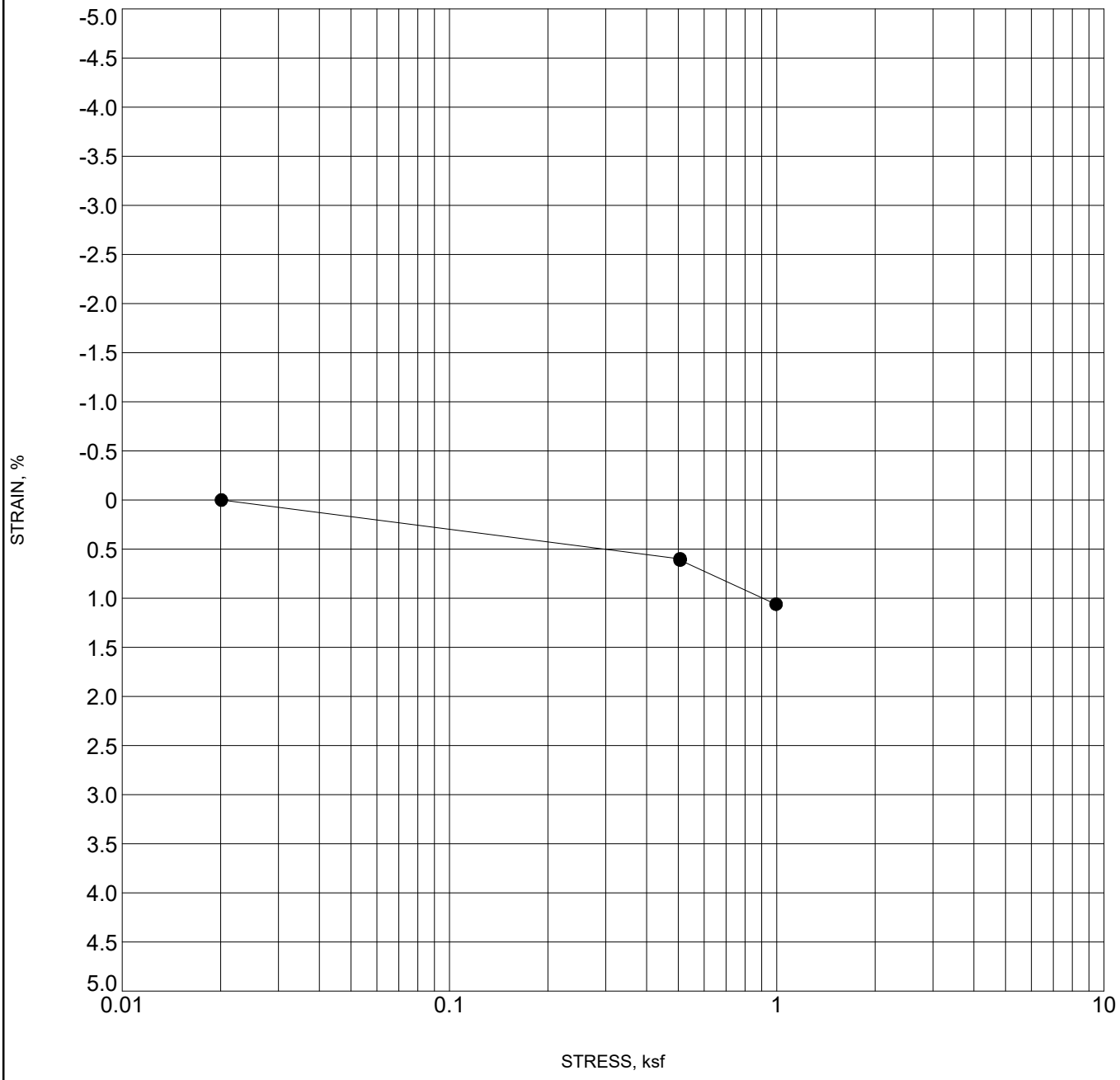
SWELL - STANDARD 599.23_CANYON VIEW GJ COLORADO.GPJ ROCKSOL TEMPLATE.GDT 2/2/21

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Canyon View Lighting Project

PROJECT NUMBER 599.23 **PROJECT LOCATION** Grand Junction, Colorado



Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-3 5**	**CLAY, silty to sandy**	**0.0**	**108.7**	**15.4**

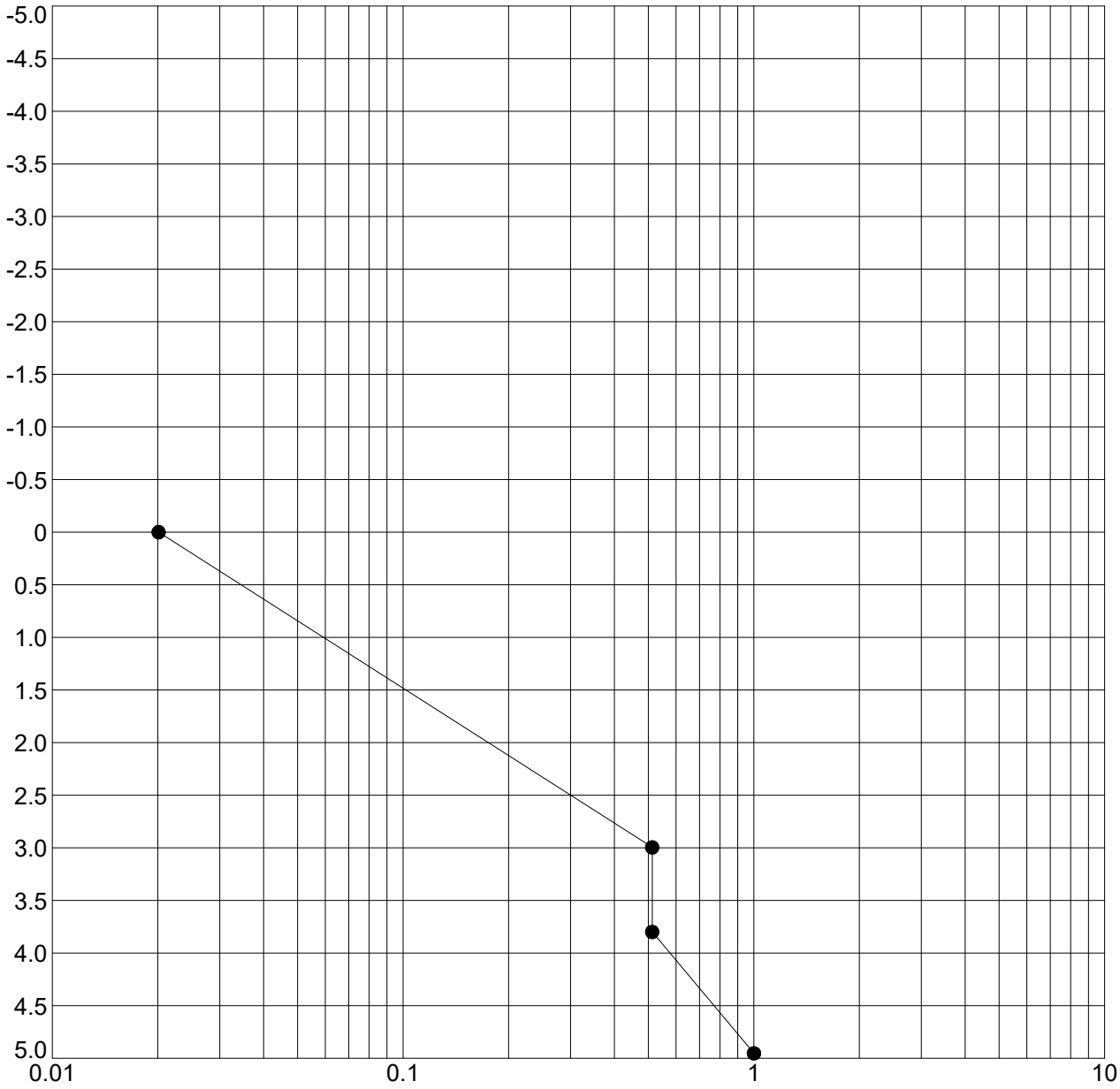
SWELL - STANDARD 599.23_CANYON VIEW GJ COLORADO.GPJ ROCKSOL TEMPLATE.GDT 2/2/21

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Canyon View Lighting Project

PROJECT NUMBER 599.23 **PROJECT LOCATION** Grand Junction, Colorado



Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-4 5**	**CLAY, silty**	**-0.8**	**106.4**	**21.2**

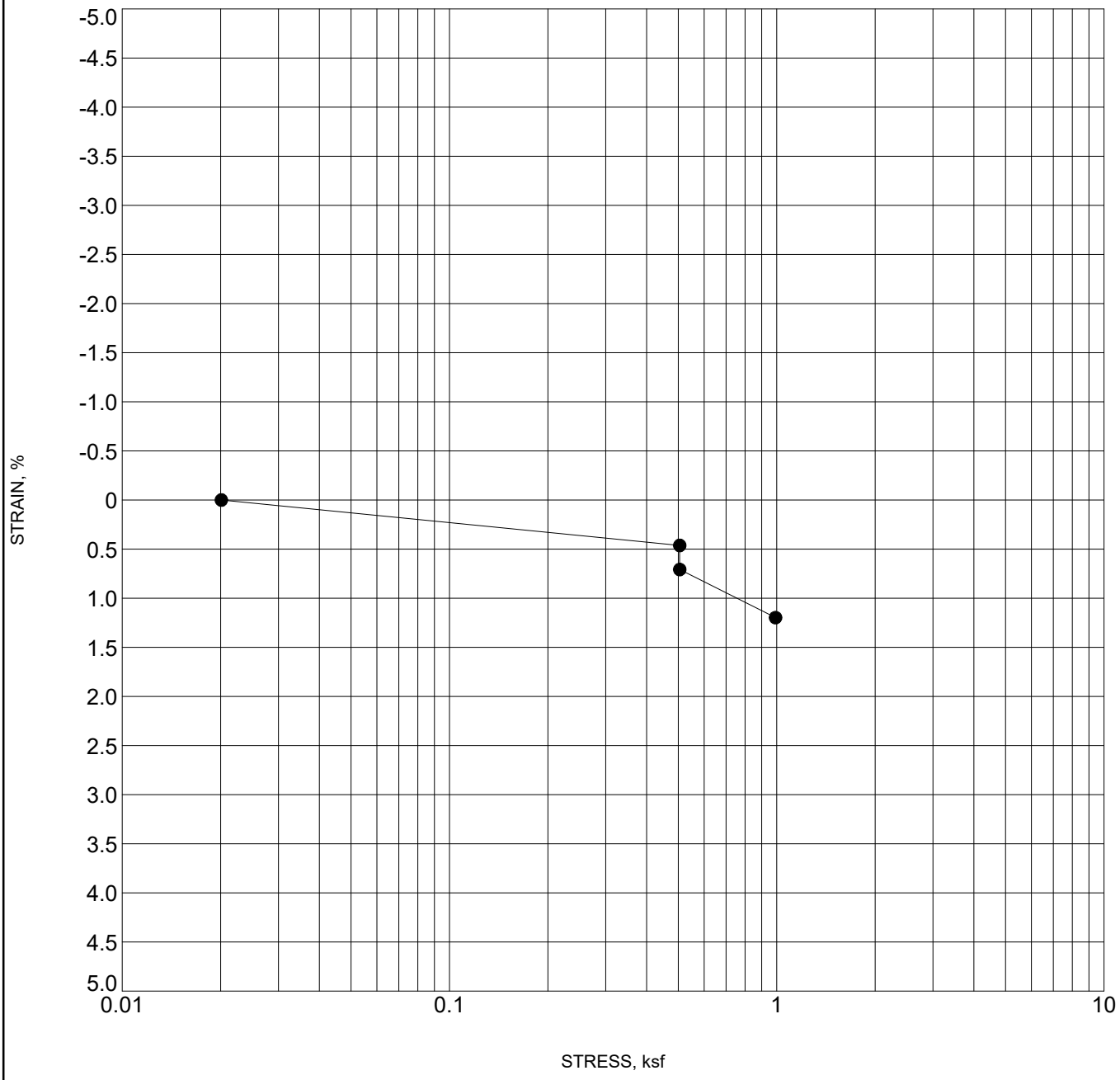
SWELL - STANDARD 599.23_CANYON VIEW GJ COLORADO.GPJ ROCKSOL TEMPLATE.GDT 2/2/21

SWELL - CONSOLIDATION TEST

RockSol Consulting Group, Inc.

CLIENT City of Grand Junction **PROJECT NAME** Canyon View Lighting Project

PROJECT NUMBER 599.23 **PROJECT LOCATION** Grand Junction, Colorado



Specimen Identification	Classification	Swell/Consol. (%)	γ_d (pcf)	MC%
● **B-5** **5**	**CLAY, silty**	**-0.2**	**92.3**	**15.4**

SWELL - STANDARD 599.23_CANYON VIEW GJ COLORADO.GPJ ROCKSOL TEMPLATE.GDT 2/2/21

APPENDIX D

IBC FOUNDATION EMBEDMENT DESIGN EQUATION

Applicable International Building Code Design Formulae

1807.3.2.1 Nonconstrained.

The following formula shall be used in determining the depth of embedment required to resist lateral loads where lateral constraint is not provided at the ground surface, such as by a rigid floor or rigid ground surface pavement, and where lateral constraint is not provided above the ground surface, such as by a s+tructural diaphragm.

$$d = 0.5A\{1 + [1 + (4.36h/A)]^{1/2}\} \quad \textbf{(Equation 18-1)}$$

where:

A = 2.34P/(S_1b).

b = Diameter of round post or footing or diagonal dimension of square post or footing, feet (m).

d = Depth of embedment in earth in feet (m) but not over 12 feet (3658 mm) for purpose of computing lateral pressure.

h = Distance in feet (m) from ground surface to point of application of "P."

P = Applied lateral force in pounds (kN).

S_1 = Allowable lateral soil-bearing pressure as set forth in Section 1806.2 based on a depth of one-third the depth of embedment in pounds per square foot (psf) (kPa).

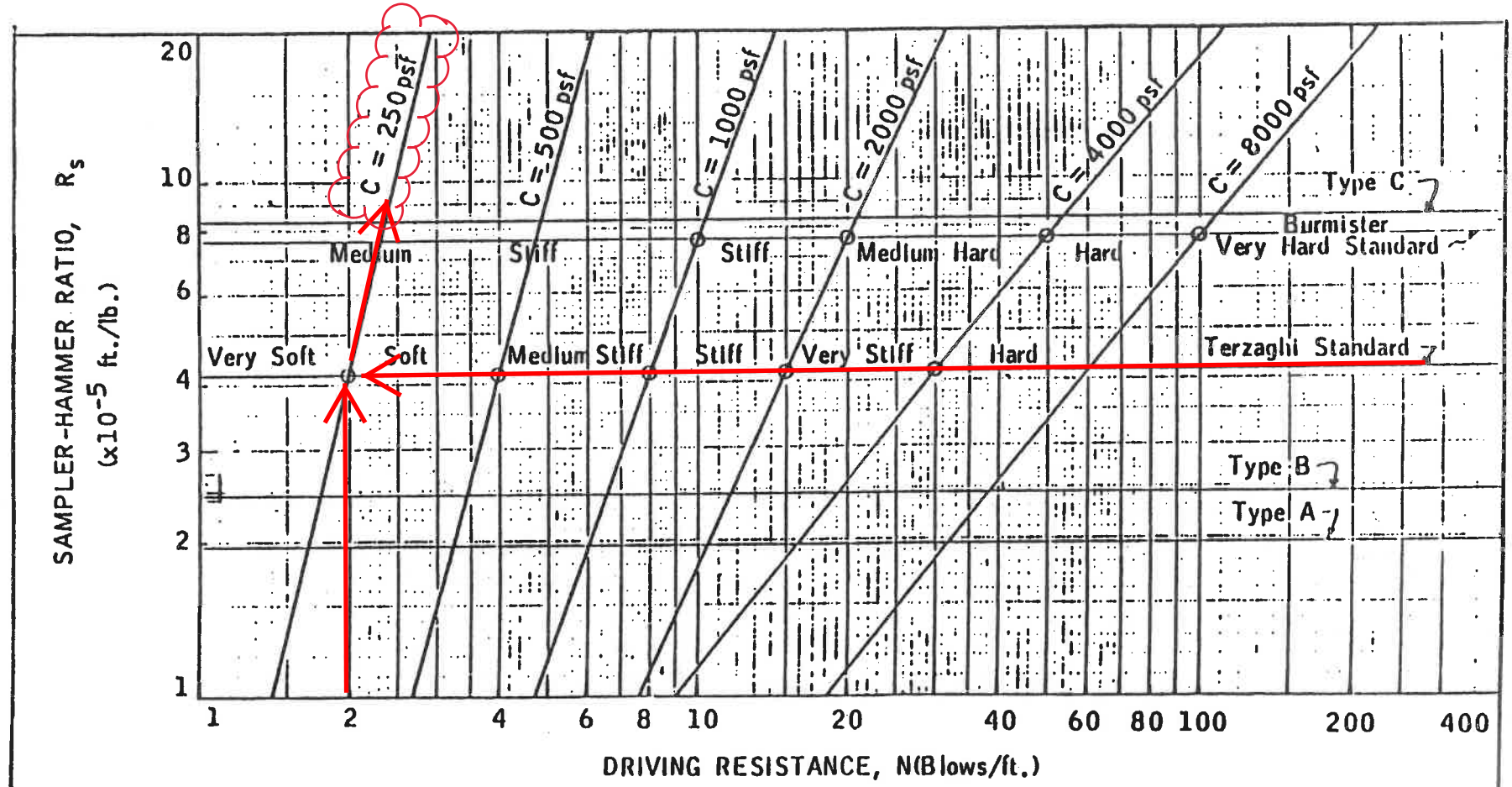
TABLE 1806.2 PRESUMPTIVE LOAD-BEARING VALUES

CLASS OF MATERIALS	VERTICAL FOUNDATION PRESSURE (psf)	LATERAL BEARING PRESSURE (psf/ft below natural grade)	LATERAL SLIDING RESISTANCE	
			Coefficient of friction[a]	Cohesion (psf)[b]
1. Crystalline bedrock	12,000	1,200	0.70	—
2. Sedimentary and foliated rock	4,000	400	0.35	—
3. Sandy gravel and gravel (GW and GP)	3,000	200	0.35	—
4. Sand, silty sand, clayey sand, silty gravel and clayey gravel (SW, SP, SM, SC, GM and GC)	2,000	150	0.25	—
5. Clay, sandy clay, silty clay, clayey silt, silt and sandy silt (CL, ML, MH and CH)	1,500	100	—	130

For SI: 1 pound per square foot = 0.0479kPa, 1 pound per square foot per foot = 0.157 kPa/m.

a. Coefficient to be multiplied by the dead load.

b. Cohesion value to be multiplied by the contact area, as limited by Section 1806.3.2 .



W = Weight of Hammer (lb.)
H = Height of Drop (in.)
D_o = Outside Diameter Sampler Shoe (in.)
D_i = Inside Diameter Sampler Shoe (in.)
R_s = Sampler-Hammer Ratio = $\frac{D_o^2 - D_i^2}{W(H)(12)}$ (ft./lb.)

(Cohesive Soils)

C = Shearing Strength (psf)

SAMPLER TYPE	W	H	D_o	D_i	R_s
TERZAGHI STANDARD	140	30	2.000	1.375	4.18×10^{-5}
BURMISTER STANDARD	250	20	3.625	2.930	7.59×10^{-5}
TYPE A	300	30	2.000	1.375	1.95×10^{-5}
TYPE B	300	24	2.000	1.375	2.44×10^{-5}
TYPE C	140	24	3.000	2.375	8.33×10^{-5}

SAMPLER DRIVING RESISTANCE VS. SHEAR STRENGTH COHESIVE SOILS

Figure C-1

IDA-Criteria for Community-Friendly Outdoor Sports Lighting v1.0

1. Compliance with all applicable Codes and Standards (e.g. Underwriter Laboratories, CEC, National Building Codes with Local Amendments)

2. **Target Illumination** – Measured on-field illuminance values appropriate for the application per IESNA RP-6-15 Sports and Recreational Area Lighting criteria (or equivalent CIE guidance) together with modeled initial illuminance targets. Only IES Class III & IV level and State High School Lighting Recommendation illumination levels are eligible for the Award of Excellence. To limit over-lighting, the design may vary by no more than 10% above the average target illuminance levels for each Class.

3. As the IES TM-15-11 Luminaire Classification System for Outdoor Lighting is not appropriate for sports lighting, a modified approach to controlling backlight, uplight, and glare is applied with the following metrics:

   A. **Backlight** – Directionality and application efficiency will be addressed indirectly through two methods that quantify off-site performance, one using the design luminance and another using measured illuminance. Backlight criteria will be difficult to meet without sufficient and appropriate setback of sports fields from the properly line.

      a. Total designed lumens not contained within the area encompassing the field perimeter and an area immediately adjacent to that area that has a 33 foot (10 meter) offset. As modeled, no more than 15% of the total lumens may be outside of this region.

      b. Measured spill illuminance values, as measured with the light meter aimed in the direction of the brightest reading, shall not exceed criteria for the respective Environmental Zone (Table 1 below) nor shall it exceed the maximum initial spill illuminance values as modeled and specified in the design process. These measurements shall be taken a distance equal to 150’ beyond the edge of the field. Measurements should be conducted with and without the facility lighting operating so that the sports facility lighting can be isolated from other natural and artificial light sources.

         Table 1 – Allowable spill illuminance to control backlight

Lighting Zone		Spill Illuminance at Setback
Environmental Zone (IESNA RP-33-99)	MLO Lighting Zone (IDA Model Lighting Ordinance)	
E2 – E4	LZ1 – LZ4	≤0.20 ft-c / ≤2.0 lux

B. **Uplight** – All luminaires must be designed such as to not to emit direct light above the horizon, unless required for the activity (i.e. aerial sports) being played. In those cases, only 8% of the total (directly) applied lumens as modeled may be in this zone. For modeling purposes, a horizontal ceiling grid shall be placed 5 feet (1.5 meters) above the top of the tallest pole, extending out to 150 feet (45 meters) beyond the edge of the field to determine compliance. Installation shall not deviate from the design.

C. **Glare** – Modeled luminous intensity from any luminaire for any viewing angle at 5' above grade level, at a distance equal to 150' beyond the edge of the field shall not exceed 1000 candela (absolute). Luminaires shall not emit more than 250 lumens in the "Very High" glare zone, ranging from 80° to 90° above nadir. This shall be verified through a luminaire photometric report and aiming summary report and visual inspection, or through an equivalent software application and visual inspection.[1]

4. **Lighting Zoning** – Community-Friendly Outdoor Sports Lighting will only be certified if located in environmental zones E2 through E4, or MLO lighting zone LZ1 through LZ4. Areas especially sensitive to lighting such as E1 or LZ0 are not appropriate for this award program.

5. **Application Efficiency** – The lighting system shall achieve a minimum Application Efficiency of 70 lumens per watt, calculated per the following formula (or the metric equivalent):

$$\frac{\text{Target area square footage} \times \text{Avg. Maintained Design ft-c}}{\text{Total System Watts}} = \text{Applied Lumens/watt}$$

''Target Area' is defined as the total grid area for the sports field and/or sports court as defined by the IES LM-5-04 IESNA Guide for Photometric Measurements of Area and Sports Lighting Installments (or CIE equivalent guidance).

[1] When commercial meters are widely available to measure luminous intensity in the field, these criteria will be amended to also require a measurement component for glare.

6. **Controls** – Provide advanced controls and documentation for the following:

    a. Automatic and/or remote control system via smartphone apps, or direct remote communication to the company facility responsible for handling the lighting controls, to enforce shut-off at locally established curfew time, not to be later than 11:00 PM (2300 hrs).

    b. On-site manual and/or remote control system shall also be provided to allow for the lights to be turned on or off at will (before curfew) to assure that only active sports fields are lighted.

    c. Provide readily accessible controls to implement uniform and variable adaptive illumination levels for different task lighting needs on field, e.g. IES class of play, competition athletics, band practice, striping, mowing, sports practice, etc. Adaptive dimming shall be possible across the range of 25% to 100% of full illumination.[2]

    d. A formal policy defining the appropriate level of illumination necessary for the specific activities and curfew times must be established and enforced. A copy of the policy will be included in the application for the Award of Excellence.

7. **Color** – Luminaire Correlated Color Temperature (CCT) may not exceed 5700°K, as defined by ANSI C78.377. Luminaire CCT must be determined through empirical measurements as defined by IESNA LM-79 (or CIE equivalent) and performed by a laboratory appropriately accredited by NVLAP. Installation shall be verified by measurement across the target area.[3]

8. **Other Lighting** – The installed field lighting is not to be used for illuminating other area tasks. For example, if parking and concession areas lighting is desired, those areas shall be illuminated by separate luminaires and systems not associated with sports field illuminance needs. Other outdoor lighting at the site must, at a minimum, meet the lighting standards and lighting codes established by the community, and must meet the standards set forth in the IDA Model Lighting Ordinance for the relevant lighting zones and tasks.

[2] IDA is developing guidance for the appropriate illumination levels for non-sports activities and tasks that often occur on playing fields.

[3] Some variance in the measured CCT values are permitted, following the ANSI guidance.

Frequently Asked Questions

IDA-Criteria for Community-Friendly Outdoor Sports Lighting

1. **Why is IDA creating criteria for IDA Community-Friendly Outdoor Sports Lighting? Aren't you simply "certifying" more light pollution?**

   Since 2007, IDA's Fixture Seal of Approval (FSA) Program has successfully evaluated roadway, wall pack and walkway luminaires that have been utilized in communities to promote the protection of the nighttime environment. Although successful, the FSA was neither developed nor intended to apply to athletic field lighting, due to the need that the facilities' luminaries had to be positioned above full cutoff orientations. This resulted in a number of issues and concerns in communities where general lighting practices were promoting dark skies, yet local sporting facilities – which were being lit with non-shielded luminaires – were exacerbating sky glow and light pollution.

   To encourage the use of the best available technology for dark sky preservation, IDA has established Criteria for Community-Friendly Outdoor Sports Lighting that upholds the values that many communities seek in their public illuminated spaces. These criteria ensure that outdoor sports lighting design minimizes obtrusive light spill and glare into surrounding neighborhoods and natural areas, meets sustainability and climate-friendly goals, and reduces sky glow to the greatest extent practicable. By utilizing IDA's criteria, communities demonstrate and promote the vision for outdoor sports lighting that simultaneously meets the demanding task of illuminating night-time sports events while preserving night skies.

2. **How will the IDA-Criteria for Community-Friendly Outdoor Sports Lighting protect my neighborhood from light pollution?**

   By adopting the IDA-Criteria for Community-Friendly Outdoor Sports Lighting, communities will:

   - Minimize neighborhood lighting nuisance by greatly reducing spill and glare disruption.
   - Manage high angle glare, thus dramatically decreasing off-site light trespass and sky glow.

- Mitigate neighborhood nuisance factors and sky glow which, in turn, provide benefits to the environment, the astronomy community, and others.
- Minimize lumen densities, which reduce energy consumption.

3. **For what types of play field is the IDA-Criteria for Community-Friendly Outdoor Sports Lighting appropriate?**

   The criteria specify that only facilities used for soccer, baseball, tennis and other recreational activities typically associated with schools and community parks qualify for consideration.

4. **Who should know about the IDA-Criteria for Community-Friendly Outdoor Sports Lighting?**

   To promote lighting that helps protect the nighttime environment, we recommend contacting city council members, community representatives, home owner associations, and parks and recreation authorities to encourage their use of the IDA-Criteria for Community-Friendly Outdoor Sports Lighting when designing or retrofitting playfields.

5. **Why do the criteria utilize a maximum allowable correlated color temperature of 5700 kelvin (k) when IDA recommends 3000k for roadway and general area lighting?**

   IDA's recommendation for correlated color temperature values of outdoor lighting applications have been, and remain, 3000k maximum. Street and area lighting illuminances are established at levels to facilitate safe way-finding and hazard identification, while minimizing light trespass and the disruption of nocturnal habitats. By contrast, sports fields have high levels of human activity and ball speeds where visibility is essential, requiring the allowance for design professional and end user preferences of light sources of up to 5700k. Nonetheless, the use of advanced technologies combined with rigorous design standards, curfews, and variable output controls tailored to the need of the activity, sports lighting facilities **can** be constructed or retrofit to essentially eliminate light trespass and curtail sky glow, protect nocturnal habitat, moderate neighborhood nuisance glare, and support dark skies.

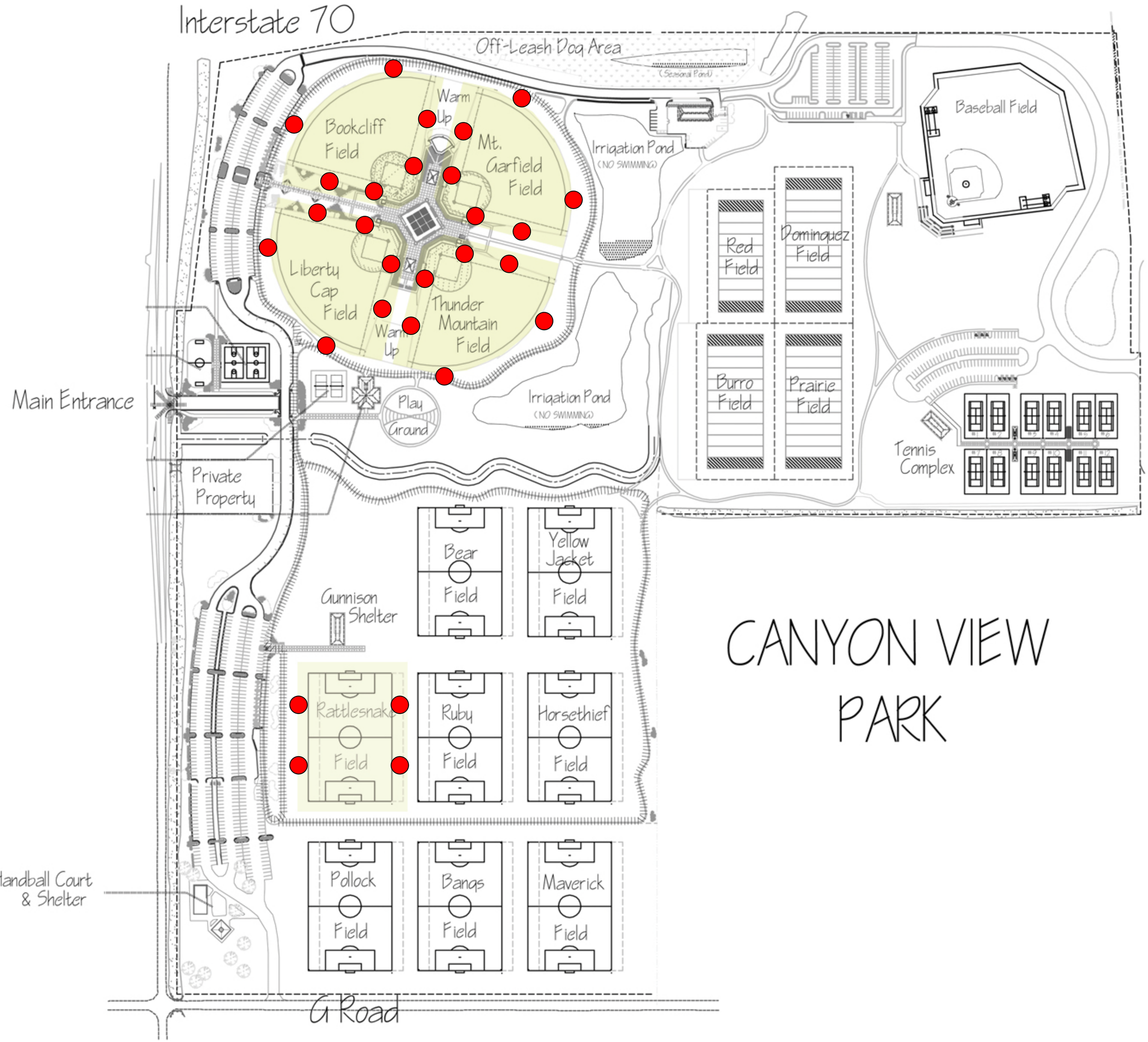
6. **Can the IDA-Criteria for Community-Friendly Outdoor Sports Lighting be achieved with existing installations?**

   Light trespass limitations of the IDA-Criteria for Community-Friendly Outdoor Sports Lighting are stringent, and likely will not be met if older technologies and design

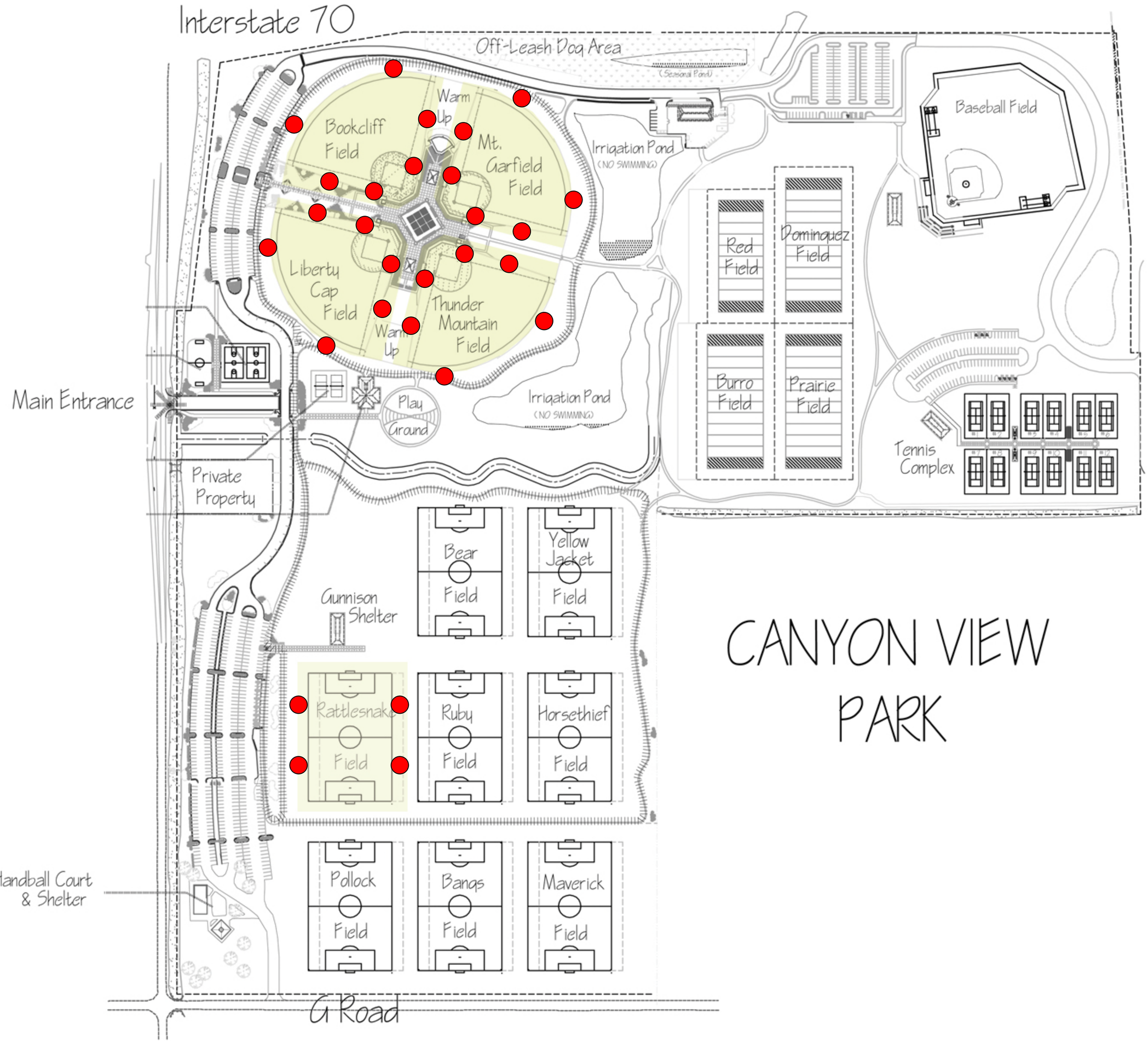
parameters are used, but holistic lighting moderniazations of legacy applications are possible under this guidelines.

7. **Does IDA intend to formally certify and recognize facilities that fully comply with the standards established in the criteria?**

   It is anticipated that in, the next several months, IDA will establish a program that certifies outdoor facilities that fully comply with IDA-Criteria for Community-Friendly Outdoor Sports Lighting. We are currently developing software that will provide preliminary evaluations of facilities and that can be used to guide their design, or retrofit, so that they meet the program's strict standards. Once a field has been constructed, or retrofit, to these standards, IDA will conduct an on-site verification test to ensure that the facility still complies with the criteria and, if so, will be certified and recognized by IDA as compliant with IDA-Criteria for Community-Friendly Outdoor Sports Lighting.



CANYON VIEW PARK


Interstate 70
Off-Leash Dog Area
(Seasonal Pond)
Warm Up
Bookcliff Field
Mt. Garfield Field
Liberty Cap Field
Thunder Mountain Field
Warm Up
Irrigation Pond
(NO SWIMMING)
Baseball Field
Red Field
Dominquez Field
Burro Field
Prairie Field
Tennis Complex
Main Entrance
Play Ground
Irrigation Pond
(NO SWIMMING)
Private Property
Bear Field
Yellow Jacket Field
Gunnison Shelter
Rattlesnake Field
Ruby Field
Horsethief Field
Handball Court & Shelter
Pollock Field
Bangs Field
Maverick Field
G Road
CANYON VIEW PARK